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UNCLASSIFIED ABSTRACT

ARAC Support of 1995 Vandenberg AFB Launches

by

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A Peacekeeper missile launch at Vandenberg Air Force Base (VAFB) was canceled during a 15-20 November 1994 window. The "NO GO" decision was based on results from the USAF Rocket Exhaust Emission Dispersion Model (REEDM), which predicted concentrations exceeding new stringent hydrogen chloride (HCl) exposure guidance from the USAF Surgeon General. Lawrence Livermore National Laboratory (LLNL) offered real-time support to 30th Space Wing Safety Office and ACTA, Inc. at VAFB for subsequent launches using the 3-D diagnostic Mass-Adjusted Three-Dimensional Wind Field/Atmospheric Dispersion by Particle-in-Cell (MATHEW/ADPIC) dispersion models of the Atmospheric Release Advisory Capability (ARAC). This paper discusses that support during the 1995 launches.

In preparation for the support, ADPIC was configured to simulate the instantaneous and continuous release plume rise functions of REEDM. The instantaneous release represents a normal successful launch, while the continuous case applies to a accident or aborted launch in which the missile explodes on or near the launch pad and the fuel burns. The catastrophic abort causes higher downwind HCl air concentrations, and is the limiting case. In both cases, by adjusting ADPIC's control parameters, we were able to calculate plume stabilization heights consistent with those predicted by REEDM.

ARAC and ACTA ran several tests to compare MATHEW/ADPIC with REEDM. These cases revealed that MATHEW/ADPIC typically produced 5-minute average HCL air concentrations a factor of 2 to 10 less than REEDM at population centers 5-10 km downwind. The differences were due to terrain effects on the wind field, enhanced dispersion from wind directional shear, and different treatment of vertical dispersion during stable nocturnal conditions when plume rise was limited by inversions.

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